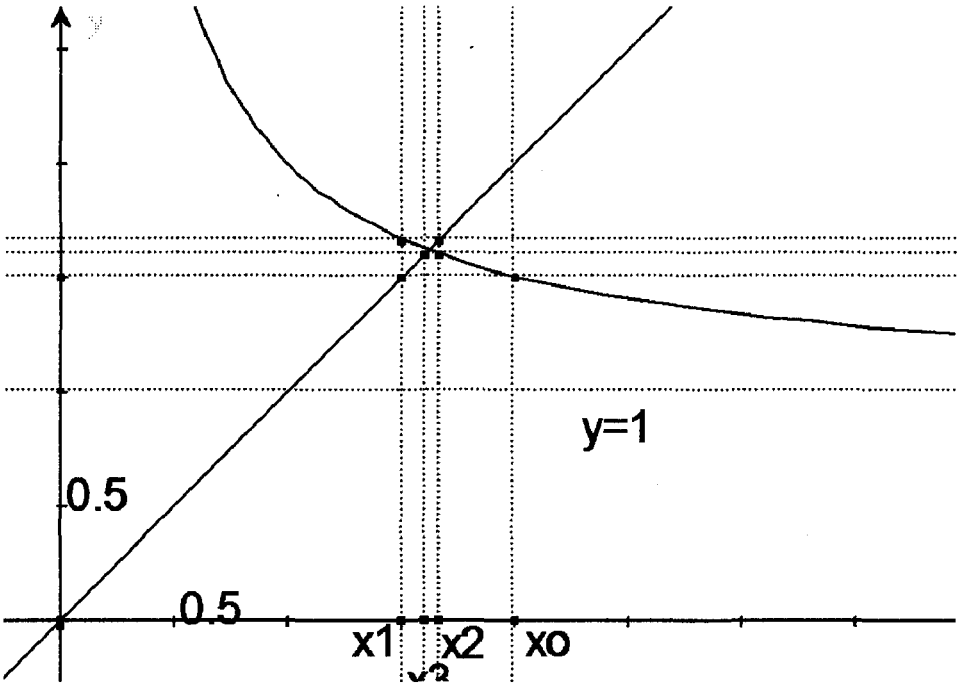
2)



3) $\varphi = \frac{1+\sqrt{5}}{2}$

$$f(\varphi) = 1 + \frac{2}{\sqrt{5}+1} = 1 + \frac{2(\sqrt{5}-1)}{4} = 1 + \frac{\sqrt{5}-1}{2} = \frac{1+\sqrt{5}}{2} = \varphi$$